

Patent claims

1. A pilot drill (1) for the preparation of a step bore (62,63,64) in the form of a blind hole, to be introduced into a jawbone (5), for receiving a dental implant (4), with:

- 5 a) a pilot tip (10), which is arranged at the apical end of the pilot drill (1) and has tip cutting edges (101);
- b) a pilot guide (11), which extends from the pilot tip (10) in the direction of the coronal end of the pilot drill (1);
- c) a drill neck (12), which lies above the pilot guide (11) and has a larger drill
10 diameter (b2) than the drill diameter (b1) of the pilot guide (11);
- d) a drill stem (13), which lies above the drill neck (12) and may be adjoined by a coupling (14) as the coronal end;
- e) at least one guide cutting edge (112) lying to the side of the pilot guide (11);
- f) a step (124), as a transition from the pilot guide (11) to the drill neck (12);
- 15 g) at least one step cutting edge (125) at the step (124); and
- h) at least one spiral groove (122) and an adjacent bevel (123),
characterized in that
- i) the tip cutting edges (101) at the pilot tip (10) are sharply formed and center-cutting;
- 20 j) chamfers (111) extend from the tip cutting edges (101) upward of the pilot guide (11);
- k) the step cutting edges (125) at the step (124) are formed in a cutting manner; and
- l) the guide cutting edges (112) are formed in a blunt, non-cutting manner.

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2. The pilot drill (1) as claimed in claim 1, characterized in that

- a) the drill neck (12) with the bevel (123) is formed in a weakly cutting manner; and
- b) the pilot guide (11) has a length (l1) in the range from 1.0 mm to 4.0 mm.

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3. The pilot drill (1) as claimed in claim 1 or 2, characterized in that

- a) the pilot drill (1) is formed with two cutting edges and consequently has two tip cutting edges (101), two chamfers (111), two guide cutting edges (112), two spiral grooves (122), two bevels (123) and two step cutting edges (125);
- b) the drill neck (12) has a length at least equal to the depth of insertion of the implant (4) to be applied;
- c) the pilot guide (11) has a length (l1) of 3.0 mm;
- d) the pilot guide (11) has a diameter (b1) in the region of 1.5 mm and the drill neck (12) has a diameter (b2) in the region of 2.0 mm;
- e) the tip angle (α) lying between the tip cutting edges (101) is less than 90°, preferably lies in the region of 80°;
- f) the spiral grooves (122) extend continuously from the coronal end of the drill neck (12) into the pilot tip (10), the spiral grooves (122) having at the pilot guide (11) only a fraction of their full cross section, as present at the drill neck (12), as a result of the smaller diameter (b1);
- g) a number of visible depth markings (121) are provided at equal or unequal intervals on the drill neck (12); and
- h) the coupling (14) adjoining the drill stem (13) is a standardized dental coupling.

4. The pilot drill (1) as claimed in one of claims 1 to 3, characterized in that

- a) the pilot guide (11) with the pilot tip (10) are intended to fix the position of the step bore (62,63,64) that is to be produced, by introducing a start of a pilot bore (61) through the cortical bone (51) of the jawbone (5), the start comprising the pilot bore guide (611) and a pilot bore tip (610);
- b) the step (124) is intended for generating a noticeably increased drilling resistance once the cortical bone (51) is penetrated, with completion of the pilot bore guide (611) and tip (610), and using this indication to check the drilling direction (R) that has been set up;

- c) the blunt guide cutting edges (112) make it possible to correct the drilling direction (R) within a conical range of correction (K) without widening the pilot bore guide (611); and
- d) the drill neck (12) with its dimensioning is intended to create the pilot bore (61) with the final depth.

5. A step drill (2) for the enlargement of a pilot bore (61) in the form of a blind hole present in a jawbone (5) into a step bore (62) or for the further enlargement of an existing step bore (62,63) into a further enlarged step bore (63,64) as a receptacle for a dental implant (4), with

- a) a step tip (20), which is arranged at the apical end of the step drill (2) and has tip cutting edges (201);
- b) a step guide (21), which extends from the step tip (20) in the direction of a coronal end of the step drill (2);
- 15 c) a drill neck (22), which lies above the step guide (21) and has a larger drill diameter (b3,b4,b5) than the drill diameter (b2',b3',b4') of the step guide (21);
- d) a drill stem (23), which lies above the drill neck (22) and may be adjoined by a coupling (24) as the coronal end;
- 20 e) at least one guide cutting edge (212) lying to the side of the step guide (21);
- f) a step (224), as a transition from the step guide (21) to the drill neck (22);
- g) at least one step cutting edge (225) at the step (224); and
- h) at least one spiral groove (222) and an adjacent bevel (223),
characterized in that
- 25 i) the tip cutting edges (201) at the step tip (20) are sharply formed;
- j) chamfers (211) extend from the tip cutting edges (201) upward of the step guide (21);
- k) the step cutting edges (225) at the step (224) are formed in a cutting manner; and
- 30 l) the guide cutting edges (212) are formed in a blunt, non-cutting manner.

6. The step drill (2) as claimed in claim 5, characterized in that

- a) the drill neck (22) with the bevel (223) is formed in a weakly cutting manner; and
- b) the step guide (21) has a length (l2,l3,l4) in the region of 2.0 mm.

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7. The step drill (2) as claimed in claim 5 or 6, characterized in that

- a) the step drill (2) is formed with three cutting edges and consequently has three tip cutting edges (201), three chamfers (211), three guide cutting edges (212), three spiral grooves (222), three bevels (223) and three step cutting edges (225);
- b) the drill neck (22) has a length at least equal to the depth of insertion of the implant (4) to be applied;
- c) the step guide (21) has a diameter (b2',b3',b4') in the region of 2.0 mm, 2.8 mm and 3.5 mm, respectively, and the drill neck (22) has a diameter (b3,b4,b5) in the region of 2.8 mm, 3.5 mm and 4.3 mm, respectively;
- d) the tip angle (β) lying between the tip cutting edges (201) is more than 90°, preferably lies in the region of 120°;
- e) the spiral grooves (222) extend continuously from the coronal end of the drill neck (22) into the step tip (20), the spiral grooves (222) having at the step guide (21) only a fraction of their full cross section, as present at the drill neck (22), as a result of the smaller diameter (b2',b3',b4');
- f) a number of visible depth markings (221) being provided at equal or unequal intervals on the drill neck (22); and
- g) the coupling (24) adjoining the drill stem (23) being a standardized dental coupling.

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8. The step drill (2) as claimed in one of claims 5 to 7, characterized in that

- a) the step guide (21) with the step tip (10) and the blunt guide cutting edges (212) is intended for centering the step drill (2) when setting it up in the pilot bore (61) or step bore (62,63) and guiding it in a centered manner when advancing along the pilot bore (61) or the step bore (62,63); and

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- b) the step (224) with the step cutting edges (225) is intended for widening the pilot bore (61) with the diameters (d1/d2) to the diameters (d2/d3) or for widening the step bore (62,63) with the diameters (d2/d3, d3/d4) to the diameters (d3/d4,d4/d5) of the step bore (63,64).

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9. A drill set comprising:

- a) a pilot drill (1) for the creation of a pilot bore (61) in the form of a blind hole, as preparation for a step bore (62,63,64) in the form of a blind hole, to be introduced into a jawbone (5), for receiving a dental implant (4);
- 10 b) at least a *first* step drill (2) for the enlargement of the existing pilot bore (61) into a step bore (62);
- c) an optional *second* step drill (2) for the second enlargement of an existing step bore (62) into a further enlarged step bore (63); and
- d) an optional *third* step drill (2) for the third enlargement of the already twice-
15 enlarged step bore (63) into a step bore (64) enlarged a final time;
- e) the pilot drill (1) having:
- ea) a pilot tip (10), which is arranged at the apical end of the pilot drill (1) and has tip cutting edges (101);
- eb) a pilot guide (11), which extends from the pilot tip (10) in the direction of the
20 coronal end of the pilot drill (1);
- ec) a drill neck (12), which lies above the pilot guide (11) and has a larger drill diameter (b2) than the drill diameter (b1) of the pilot guide (11);
- ed) a drill stem (13), which lies above the drill neck (12) and may be adjoined by a coupling (14) as the coronal end;
- 25 ee) at least one guide cutting edge (112), lying to the side of the pilot guide (11);
- ef) a step (124), as a transition from the pilot guide (11) to the drill neck (12);
- eg) at least one step cutting edge (125) at the step (124); and
- eh) at least one spiral groove (122) and an adjacent bevel (123); and
- 30 f) the step drill (2) has:

- fa) a step tip (20), which is arranged at the apical end of the step drill (2) and has tip cutting edges (201);
- fb) a step guide (21), which extends from the step tip (20) in the direction of the coronal end of the step drill (2);
- 5 fc) a drill neck (22), which lies above the step guide (21) and has a larger drill diameter (b3, b4, b5) than the drill diameter (b2', b3', b4') of the step guide (21);
- fd) a drill stem (23), which lies above the drill neck (22) and may be adjoined by a coupling (24) as the coronal end;
- 10 fe) at least one guide cutting edge (212), lying to the side of the step guide (21),
- ff) a step (224), as a transition from the step guide (21) to the drill neck (22);
- fg) at least one step cutting edge (225) at the step (224); and
- fh) at least one spiral groove (222) and an adjacent bevel (223),
- 15 characterized in that
- g) on the pilot drill (1):
- ga) the tip cutting edges (101) at the pilot tip (10) are sharply formed and center-cutting;
- gb) chamfers (111) extend from the tip cutting edges (101) upward of the pilot
- 20 guide (11);
- gc) the step cutting edges (125) at the step (124) are formed in a cutting manner; and
- gd) the guide cutting edges (112) are formed in a blunt, non-cutting manner;
- h) on the step drill (2):
- 25 ha) the tip cutting edges (201) at the step tip (20) are sharply formed;
- hb) chamfers (211) extend from the tip cutting edges (201) upward of the step guide (21);
- hc) the step cutting edges (225) at the step (224) are formed in a cutting manner; and
- 30 hd) the guide cutting edges (212) are formed in a blunt, non-cutting manner;
- i) the diameter (b2') of the *first* step drill (2) at the step guide (21) corresponds to the diameter (b2) at the drill neck (12) of the pilot drill (1); and

- j) the diameter (**b3',b4'**) of the *second* and *third* step drills (**2**) at the step guide (**21**) corresponds to the diameter (**b3,b4**) at the drill neck (**22**) of the previous *first* or *second* step drill (**2**), respectively.

5 10. The drill set as claimed in claim 9, characterized in that, of the pilot drill (**1**), the drill neck (**12**) with the bevel (**123**) is formed in a weakly cutting manner and its pilot guide (**11**) has a length (**l1**) in the range from 1.0 mm to 4.0 mm.

- 10 11. The drill set as claimed in claim 9 or 10, characterized in that
- a) the pilot drill (**1**) is formed with two cutting edges and consequently has two tip cutting edges (**101**), two chamfers (**111**), two guide cutting edges (**112**), two spiral grooves (**122**), two bevels (**123**) and two step cutting edges (**125**);
 - 15 b) the drill neck (**12**) has a length at least equal to the depth of insertion of the implant (**4**) to be applied;
 - c) the pilot guide (**11**) has a length (**l1**) of 3.0 mm;
 - d) the pilot guide (**11**) has a diameter (**b1**) in the region of 1.5 mm and the drill neck (**12**) has a diameter (**b2**) in the region of 2.0 mm;
 - 20 e) the tip angle (α) lying between the tip cutting edges (**101**) is less than 90°, preferably lies in the region of 80°;
 - f) the spiral grooves (**122**) extent continuously from the coronal end of the drill neck (**12**) into the pilot tip (**10**), the spiral grooves (**122**) having at the pilot guide (**11**) only a fraction of their full cross section, as present at the drill neck (**12**), as a result of the smaller diameter (**b1**);
 - 25 g) a number of visible depth markings (**121**) are provided at equal or unequal intervals on the drill neck (**12**); and
 - h) the coupling (**14**) adjoining the drill stem (**13**) is a standardized dental coupling.

12. The drill set as claimed in one of claims 9 to 11, characterized in that

- a) the pilot guide (11) with the pilot tip (10) are intended to fix the position of the step bore (62,63,64) that is to be produced, by introducing a start of a pilot bore (61) through the cortical bone (51) of the jawbone (5), the start comprising the pilot bore guide (611) and a pilot bore tip (610);
- b) the step (124) is intended for the purpose of generating a noticeably increased drilling resistance once the cortical bone (51) is penetrated, with completion of the pilot bore guide (611) and tip (610), and use this indication to check the drilling direction (R) that has been set up;
- c) the blunt guide cutting edges (112) make it possible to correct the drilling direction (R) within a conical range of correction (K) without widening the pilot bore guide (611); and
- d) the drill neck (12) with its dimensioning is intended to create the pilot bore (61) with the final depth.

13. The drill set as claimed in claim 9, characterized in that, of the step drill (2), the drill neck (22) with the bevel (223) is formed in a weakly cutting manner and its step guide (21) has a length (I2,I3,I4) in the region of 2.0 mm.

14. The drill set as claimed in claim 9 or 13, characterized in that

- a) the step drill (2) is formed with three cutting edges and consequently has three tip cutting edges (201), three chamfers (211), three guide cutting edges (212), three spiral grooves (222), three bevels (223) and three step cutting edges (225);
- b) the drill neck (22) has a length at least equal to the depth of insertion of the implant (4) to be applied;
- c) the step guide (21) has a diameter (b2',b3',b4') in the region of 2.0 mm, 2.8 mm and 3.5 mm, respectively, and the drill neck (22) has a diameter (b3,b4,b5) in the region of 2.8 mm, 3.5 mm and 4.3 mm, respectively;
- d) the tip angle (β) lying between the tip cutting edges (201) is greater than 90°, preferably lies in the region of 120°;

- e) the spiral grooves (222) extend continuously from the coronal end of the drill neck (22) into the step tip (20), the spiral grooves (222) having at the step guide (21) only a fraction of their full cross section, as present at the drill neck (22), as a result of the smaller diameter (b2',b3',b4');
- 5 f) a number of visible depth markings (221) being provided at equal or unequal intervals on the drill neck (22); and
- g) the coupling (24) adjoining the drill stem (23) is a standardized dental coupling.

10 15. The drill set as claimed in one of claims 9, 13 or 14, characterized in that

- a) the step guide (21) with the step tip (10) and the blunt guide cutting edges (212) is intended for centering the step drill (2) when setting it up in the pilot bore (61) or step bore (62,63) and guiding it in a centered manner when
15 advancing along the pilot bore (61) or the step bore (62,63); and
- b) the step (224) with the step cutting edges (225) is intended for widening the pilot bore (61) with the diameters (d1/d2) to the diameters (d2/d3) or for widening the step bore (62,63) with the diameters (d2/d3,d3/d4) to the diameters (d3/d4,d4/d5) of the step bore (63,64).